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With Mr Glover's compliments.

Hans Lundberg
RIVIERE DU-LOUP

GOLD FIELDS,

*In Townships of Jersey
And Yiniere, C. C.*

QUEBEC DISTRICT,

JUNE, 1864.

BOSTON:

PRINTED BY E. L. MITCHELL, 24 CONGRESS STREET.

1864,

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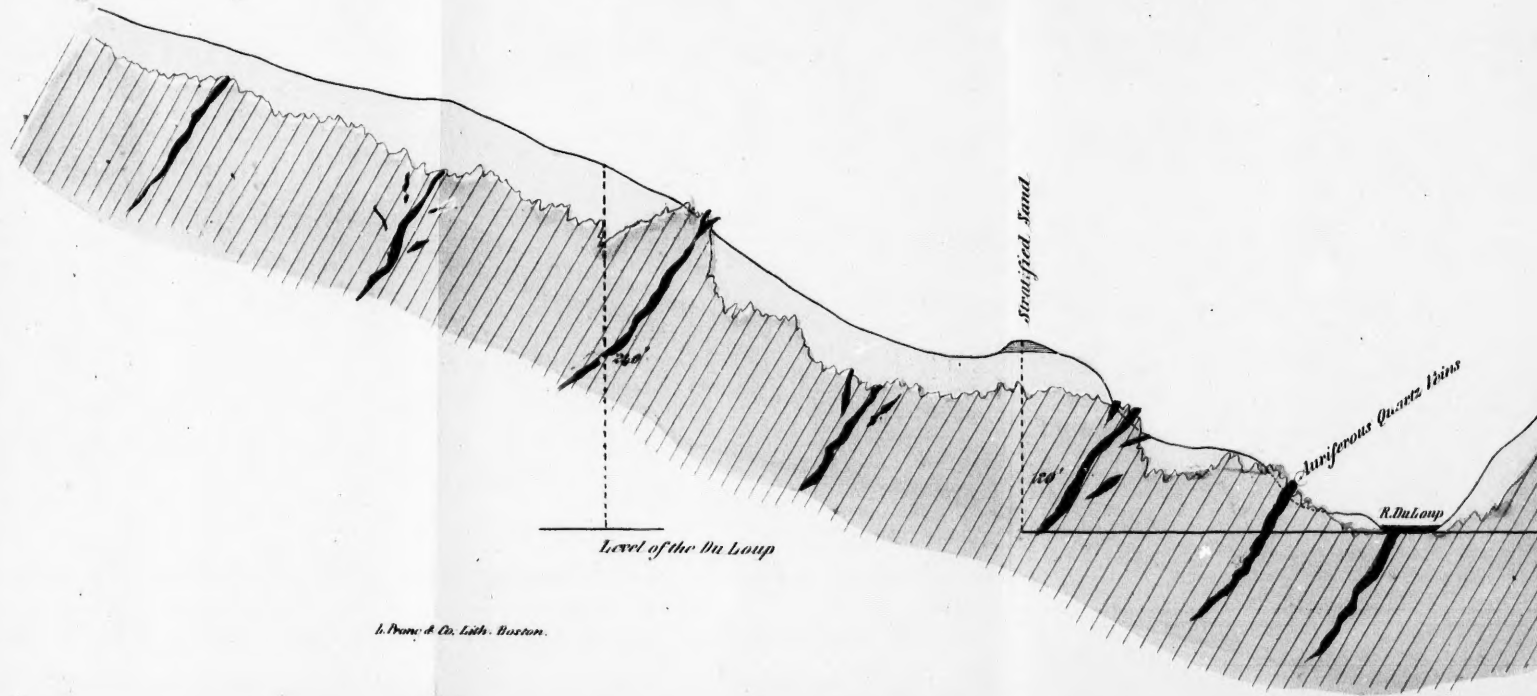
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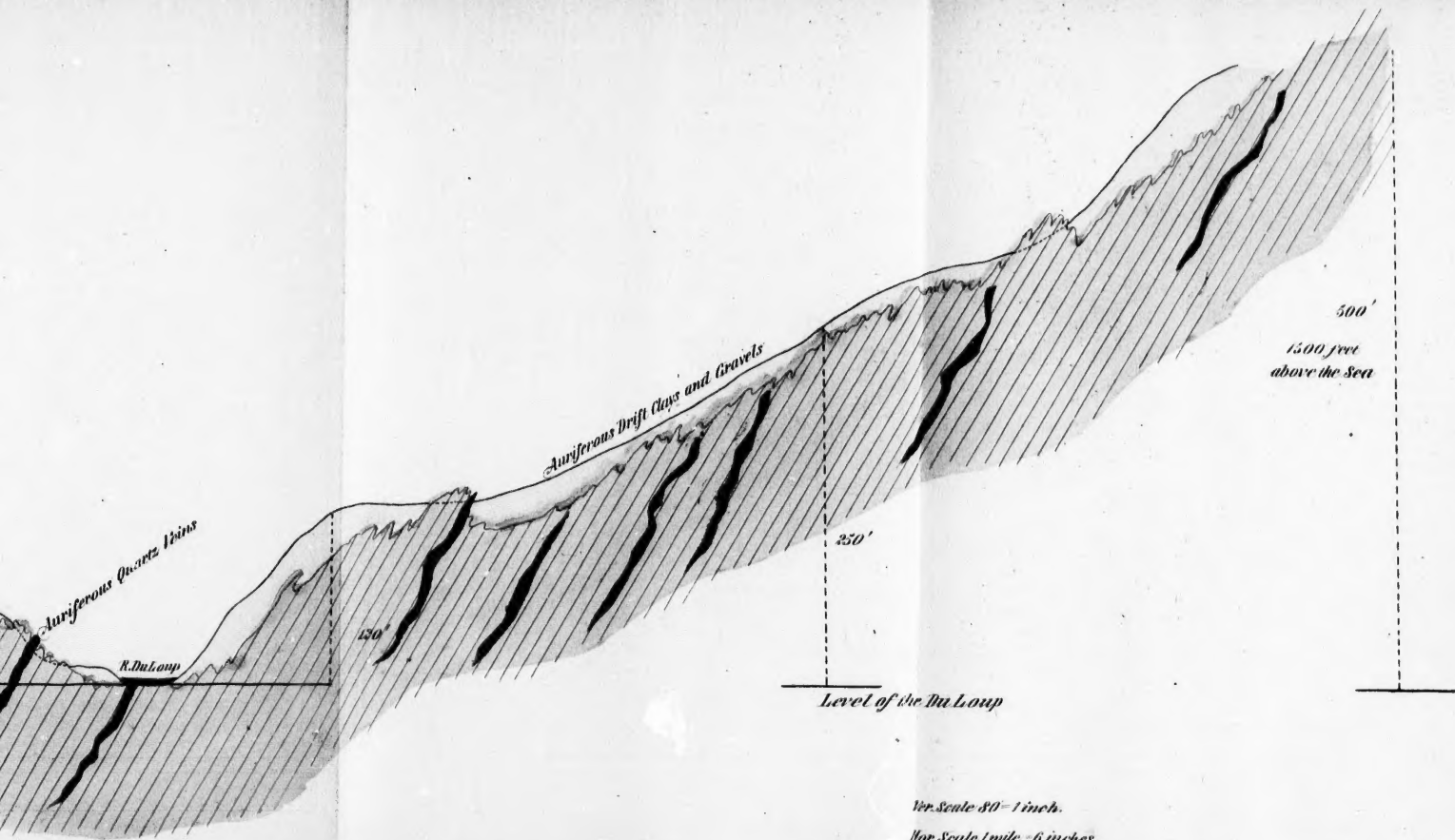
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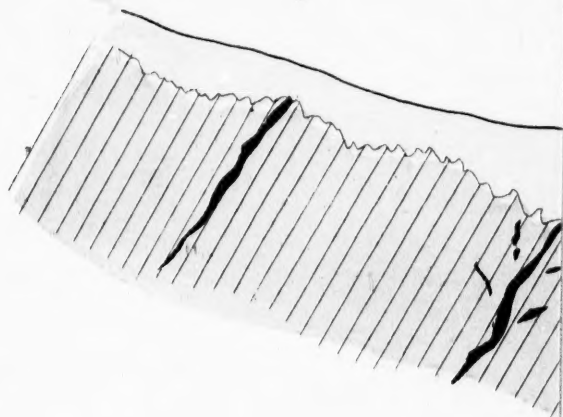
IDEAL SKETCH of the VALLEY of the RIVIÈRE
Showing the relation of the Drift to the Upper Silurian



of the VALLEY of the RIVIÈRE DU LOUP;
Drift to the Upper Silurian Slates and Main Quartz veins.

Ver. Scale 80' = 1 inch.

Hor. Scale 1 mile = 6 inches.



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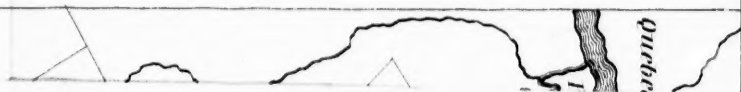
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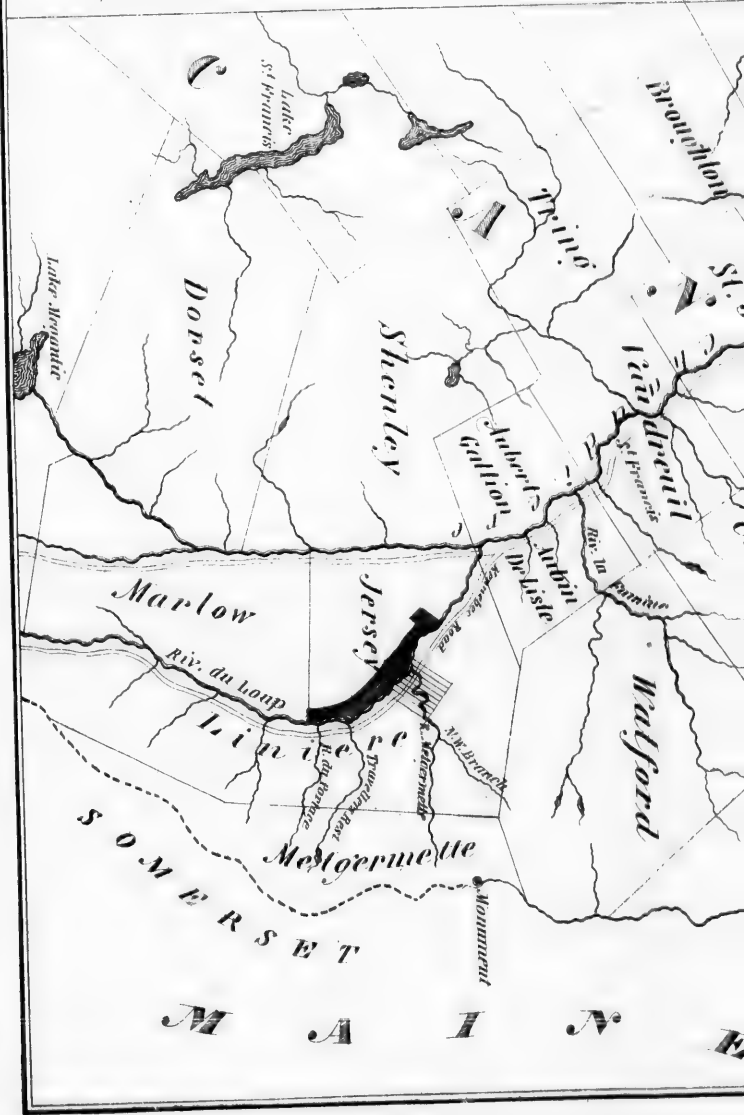
Map of the
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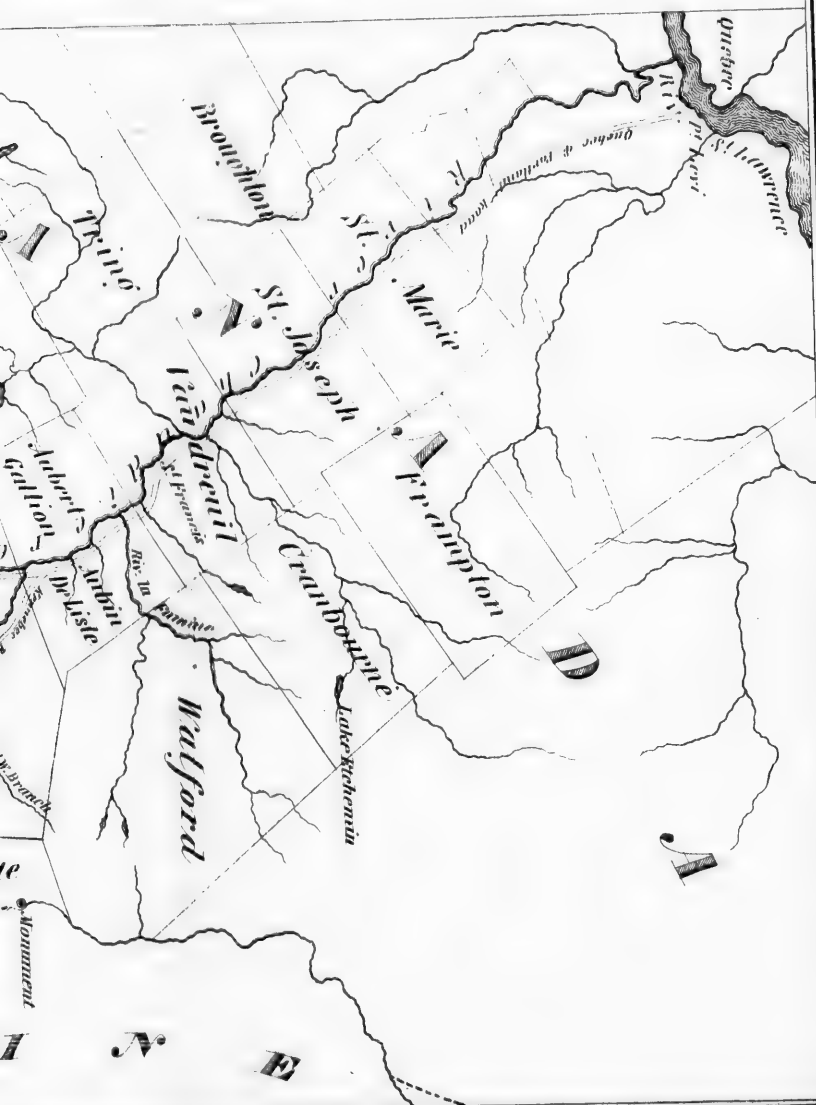
Map of the
and Bearing Region
of the
Du Loup, & their Tributaries.
Canada East.



L. Prang & Co Lith. Boston



Map of the
 Old Bearing Region
 of the
 Du Loup & their tributaries.
 Canada East.



REPORT

ON THE

Auriferous District,

OF

RIVIÈRE DU LOUP AND TRIBUTARIES,

BY

HENRY YOULE HIND, M. A., F. R. G. S. (ENG.)

ALSO

REPORT OF EXAMINING COMMITTEE,

AND EXTRACTS FROM SIR WILLIAM LOGAN'S REPORTS.



BOSTON:

E. L. MITCHELL, PRINTER, 24 CONGRESS STREET.

1864.

REPORT.

To the subscribers to the conditional agreement, dated at Boston, May 6th, 1864, for the purchase of certain lands and mining rights situated on the Rivière du Loup, emptying into the Chaudière, in Lower Canada.

GENTLEMEN :

Your Committee respectfully submit the following report :

They have performed the duty assigned them of visiting the territory in question. The tract of land under consideration is situated on the Rivière du Loup, in the township of Jersey and Linière. From Quebec the territory is distant seventy-five miles over the Kennebec Road, of which ten miles is macadamized, and throughout the whole distance in excellent order for light or for heavy vehicles, and mostly level, passing through a well settled country which has been under cultivation for two hundred years. From the County of Somerset and the boundary line of the State of Maine, this territory is less than twelve miles distant. It will appear, therefore, that this district is placed within easy reach, whether from Quebec or from Maine, and can be visited within forty-eight hours' travel from Boston, that it is in the immediate vicinity of one of the oldest settled portions of North America, among

prosperous and well-ordered communities; that the access is direct and easy. In these respects this tract offers singular advantages over many mining properties, which, however intrinsically valuable, are so remotely placed as to forbid or discourage both investigation and operation. It should not be overlooked, also, that the soil is fertile, the growth of trees and heavy timber of various kinds abundant, while the numerous streams tributaries to the Du Loup, the Chaudiere, and through these to the St. Lawrence, afford a water carriage of great value to the property. A thorough examination of it has been made, the results of which have been eminently satisfactory. The details of explorations and experiments, which were numerous and varied, of the river bed and high grounds adjacent, will be found in the reports, written and verbal, of the parties engaged.

The methods and extent of investigation were as follows: and consisted of scientific observation and practical experiment, the former conducted by Professor Hind, the latter, by Messrs. French, Ward, Tuck, Russell, and St. John, and all with the personal cognizance and co-operation of the whole Committee.

Professor Hind was selected by the government of Canada in 1857, to accompany the expedition despatched by that government to survey the country between Lake Superior and the Red River of the North, in the capacity of Geologist and Naturalist. In 1858, he was placed in charge of the Assiniboine and Saskatchewan Exploring Expedition, and was instructed to make a Topographical and Geological Exploratory Survey of the country between the Red River of the

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North and the elbow of the South Branch of the Saskatchewan. His reports on these expeditions have been published by the Canadian Government, and also laid before the House of Commons, and published by command, with several additional maps, both geological and topographical, executed by Arrowsmith, under Professor Hind's supervision. These maps embody all the recent discoveries in that region up to 1860.¹

Professor Hind has also published, in two octavo volumes, a "Narrative of the Canadian Red River Exploring Expedition of 1857," and of the "Assiniboine and Saskatchewan Exploring Expedition of 1858," illustrated with twenty Chromoxylographs, seventy-six wood cuts, three maps (topographical and geological), four plans, and a sheet of profiles of the country explored.²

In 1861 Mr. Hind conducted an exploratory survey up the Moisie River to the table land of the Labrador Peninsula. An illustrated description and narrative of this expedition³ has been recently published in London in two volumes octavo, by Longman & Co.

He is now engaged in making a preliminary geological survey of the province of New Brunswick for the government of the colony.

¹ These reports can be procured from Eyre & Spottiswoode, Queen's Printers, London; or from P. S. King, Parliamentary General Bookseller, 34 Parliament street, London. (Assiniboine and Saskatchewan Exploring Expedition, price 7s. 6d, sterling.)

² Longman & Co., London, price two guineas.

³ "Explorations in the Interior of the Labrador Peninsula, the country of the Montagnais and Nasquepec Indians," illustrated with twelve Chromolithographs, twenty-four wood cuts, and two maps. Price 32s sterling; Longman & Co., London.

Mr. Russell has been nine years in California employed in mining. Mr. Tuck is also an experienced miner of California, and Mr. St. John a successful quartz miner of Australia. Messrs. Ward and French are members of your Committee, the former having been engaged also in mining operations in California.

Your Committee were also fortunate enough to have an interview, arranged by appointment, with Sir William Logan, the eminent geologist of Canada, who has been for upwards of twenty years employed by the British government in the survey of Canada and other portions of British America, who expressed to your Committee the deliberate opinion that operations properly conducted upon this auriferous tract must prove highly remunerative. To his "Notes on the Gold of Eastern Canada," being a reprint of various reports of the Geological Survey of Canada from 1848 to 1863, published by Dawson Brothers, Montreal, 1864, your Committee most especially beg to call your attention, a pamphlet which completely justifies the conclusions arrived at by Professor Hind.

Your Committee, therefore, proceeded to avail themselves of the authority conferred upon them to close the purchase of the said territory, which they did in writing, subject to the condition that the titles upon examination prove to be satisfactory to them, and that the laws of Canada guarantee to the purchasers all and every right, title, and interest to the minerals mined. All which points have been submitted to the consideration of George Okill Stuart, Esq., of Quebec, a gentleman of the highest standing in the legal profession, and now, or lately, Queen's Counsel.

In conclusion, your Committee, feeling their responsibility, recur to the facts that to personal examination they have added the most eminent scientific authority, practical experience, and legal advice.

LEVERETT SALTONSTALL, DANL. SARGENT CURTIS, P. C. BROOKS, JR. S. L. FRENCH, H. B. WARD, PLINY FISK,	} Committee.
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Boston, June 22d, 1864.

EXTRACT FROM
"NOTES ON THE GOLD OF EASTERN CANADA."

BY SIR W. LOGAN.

Dawson Brothers, Publishers, Montreal, 1864.

"It has been shown that the washing of the ground over the area of one acre, with an average depth of two feet, equal to 87,120 cubic feet, gave in round numbers about 5,000 pennyweights of gold, or one and thirty-eight hundredths grains to the cubic foot, which is equal to one and three-quarters grains of gold to the bushel. Now, according to Mr. Blake, earth containing one forty-fourth part of this amount, or one twenty-fifth of a grain of gold, can be profitably washed by the hydraulic method; while the labor of two men, with a proper jet of water, suffices to wash one thousand bushels in a day; which, in a deposit like that of Riviere du Loup, would contain about seventy-three pennyweights of gold. It is probable, however, that a certain portion of the finer gold dust, which is collected in the ordinary process, would be lost in working on a larger scale. It has been already shown that the gold in Canada is not confined to the gravel of the river channels, and the alluvial flats; but it is found on the Metgermette and St. Francis rivers, at from fifty to a hundred and fifty feet above their beds; and although its proportion were to be many times less than in the gravel of the Riviere du Loup, these thick deposits, which extend over great areas, might be profitably worked by the hydraulic

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method. The fall in most of the tributaries of the Chaudiere and of the St. Francis, throughout the auriferous region, is such that it would not be difficult to secure a supply of water with a sufficient head, without a very great expenditure in the construction of canals; and it may reasonably be expected that before long the deposits of gold-bearing earth, which are so widely spread over southeastern Canada, will be made economically available."

To Leverett Saltonstall, Daniel Sargent Curtis, Peter C. Brooks, Jr., S. L. French, Henry B. Ward, of Boston, Mass., and Pliny Fisk, of Philadelphia, Penn.

GENTLEMEN :

I have the honor to submit the accompanying report on the auriferous district of Canada East, drained by the Rivière du Loup and some of its tributaries, which I visited in company with one of the members of your committee, during the first and second weeks of June in the present year.

I have marked on the Surveyor's map with a yellow spot, the places where I saw gold extracted from the drift gravels and clays; but I am of opinion that the whole of the drift covering the area referred to in this report, is auriferous.

I also send an ideal sketch of the valley of the Riviere du Loup, to exhibit the relation of the upper silurian clay slates, with their associated quartz veins, to the drift, by which they are in a great measure overlaid.

I am, Gentlemen,

Very respectfully yours,

HENRY YOULE HIND.

QUEBEC, 14th June, 1864.

CONTENTS.

-
- I. GEOGRAPHICAL FEATURES.
 - II. GEOLOGICAL FEATURES.
 - a. UPPER SILURIAN SLATES.
 - b. QUARTZ VEINS.
 - 1. THE MAIN OR OLDER VEINS.
 - 2. THE OBLIQUE VEINS.
 - 3. THE NEWER VEINS.
 - c. THE BOULDERS IN THE RIVER.
 - d. THE DRIFT CLAYS, GRAVELS, AND SANDS.
 - III. THE GOLD OF THE RIVIERE DU LOUP AND ITS TRIBUTARIES.
 - a. THE METGERMETTE.
 - b. THE RIVER DU LOUP.
 - c. THE UPPER DRIFT.
 - d. THE METGERMETTE WITH THE CRADLE.
 - e. CRADLING ON THE DU LOUP.
 - IV. ESTIMATE OF THE VALUE OF THE DRIFT.
 - V. ORIGIN OF THE GOLD.
 - VI. THE BLACK SAND.
 - VII. CONCLUSION.

I. GEOGRAPHICAL FEATURES.

The tract of country to which the following report refers, lies on the Riviere du Loup, a tributary to the Chaudiere, which empties into the St. Lawrence a few miles above Quebec. The Metgermette, a tributary of the Du Loup, flows diagonally through all the lots in Linière, although it is not so shown on the map, which in this respect, as well as in the bends or windings of the Du Loup, is incorrectly drawn. It enters the Du Loup about the middle of lot ———.

Several small tributaries flow through the lots enumerated, into the Du Loup, one of which, crossing lot 40, is about one-third of the size of the Metgermette in June.

East and west of the Du Loup, the country rises to a plateau in some places in the form of an escarpment on the river, in others gradually, to an altitude varying from sixty to one hundred and twenty feet above the level of the stream. Where the rise is abrupt, land slides disclose occasionally the character of the sloping cliffs, which are seen to consist of a very tenacious bluish clay, holding many worn fragments of rock similar to the upper silurian slates exposed in the bed of the river, and masses of unworn slate, showing a local origin, also small boulders and pebbles from a northern source; which will be noticed hereafter.

The blue clay may be, in some places, fifty feet thick, but this occurs only in the ancient bed or valley of the river, for, by tracing the course of the tributary streams (a mill creek on lot 31, for instance), about two miles

from the Riviere du Loup, and to an altitude above it exceeding 350 or 400 feet, the slates are seen in position, and are so observed in many parts of the stream, some 25 to 30 feet below the surface of the drift clays and gravels.

The blue clay is capped by a yellowish gravelly clay, also holding numerous fragments of unworn masses of slates similar to the rock of the country as seen in the river, as well as fragments and small masses of quartz, often very ferruginous, easily disintegrated, and similar in appearance to the quartz veins running parallel to the stratification in the slates beneath.

The plateaux, to which reference have been made, vary in breadth from a few yards to several hundred yards, and are succeeded on the west by a gradual rise to the summit of the ridge which divides the waters flowing into the Riviere du Loup from those which are tributary to the Chaudiere. The utmost altitude attained in the tract of country under review does not, probably, exceed 500 feet above the river; and as this is supposed to be about 900 feet above the sea, the highest point will be, approximately, 1400 feet above the same level.

The entire country on the west of the Du Loup is densely wooded, and an excellent bird's-eye view of the whole tract can be obtained from the summit of a hill on the Kennebec road, about $2\frac{1}{2}$ miles due south of Ray's house, on lot 74, east of the river.

The soil appears to be of good quality wherever examined, and over wide areas the sugar maple is found growing in great abundance and of large size.

The Du Loup, at its summer level, has an average

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width of twenty-five yards, with a depth not exceeding fifteen inches in the deepest part; at the beginning of June its mean breadth is about thirty yards, with a depth in the channel of eighteen or twenty inches; in early spring, when the snows melt, it rises fully five feet above its level in June, as shown by the existing water-marks on its banks.

The current is very rapid, in fact the river is a series of small rapids, and its fall may be approximately estimated at twelve feet in the mile. In its bed are numerous boulders; by far the greater number of these came from the upper silurian slates, reefs of which cross the river occasionally. Those boulders which have the aspect of a northern origin, will be described in the sequel.

The course of the Du Loup within the limits of the property described, is nearly due north for a space of nine miles; and the distance of the south boundary of lot 47 in Jersey, the most southern part, is about eleven miles from the boundary line by the Kennebec road to and through the State of Maine.

Mr. Ray's house on lot 74, is seventy-five miles from Quebec via the Kennebec road, which is well settled throughout to within four miles of the boundary line. The settlements on the du Loup south of the northern boundary of the tract under review, are on the east side of the river; below this line they continue on both sides of the du Loup and Chaudiere as far as the St. Lawrence.

II. GEOLOGICAL FEATURES.

a. UPPER SILURIAN SLATES.

The rocks which appear in places within the limits of the tract described, consist of upper silurian clay slates. The strike is west 15° south, magnetic, but the variation being $16^{\circ} 45'$ East, the true strike is W. 31° S., and the dip southerly, at a very high angle, varying from 72° on the Metgermette to 85° , or nearly perpendicular, on the Riviere du Loup. The slates appear in sites in many places on the Metgermette, the Riviere du Loup, and on a mill creek (lot 31, and the rear lot on the 8th range of Jersey) at an altitude of about 400 feet above the main stream. They are also seen to crop out in the ploughed fields on the east side of the Du Loup, some 60 feet above the river, and they were met with about 15 feet below the drift on the Kennebec road, close to Ray's house, when sinking a well.

Reefs of these slates frequently cross the main river and its tributaries, forming rapids. They are often worn into pot-holes on its banks, and smoothed by ice and running water. Sometimes they present a banded or ribboned appearance, and occasionally a smooth reddish surface and an arenaceous composition. Some of the layers split into large thin slabs, which would fit them for roofing purposes. When exposed to the action of air and running water they occasionally become very fissile and easily break up into thin laminae, wearing down and disintegrating rapidly. Other bands, again, are hard and very persistent, weathering red when exposed to running water, and are slightly arenaceous,

FIGURES.

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approaching the character of argillaceous sandstones. On breaking or splitting a slab, cubical crystals of iron pyrites are frequently met with, and sometimes a slab several feet square will be found to be studded with perfect cubes of this mineral.

b. QUARTZ VEINS.

The slates are intersected by three sets of quartz veins which may be briefly described as follows :

1. The main or largest and older veins, running generally with the strikes of the slates, and often assuming the form of a bedded rock, but occasionally enlarging into bunches. These are highly crystalline, and composed, towards the centre, of white quartz, containing cavities lined with quartz crystals. The outer portions of the veins, which are from 6 inches to 20 inches in diameter, are frequently colored with the peroxide of iron, and the cavities which occur in them are often filled with decomposing iron pyrites ; sometimes with crystallized carbonate of lime, and sometimes with chlorite.

Where the veins expand into bunches they are generally highly colored with the peroxide, and are easily broken into small fragments by the blows of a hammer. The internal white portion is, however, very hard, and not unfrequently solid.

2d. *The Oblique Veins.*

When the slates crop out in the bed of the river they are sometimes seen to be capped with quartz, which sends numerous ramifications in all direction?

downwards and laterally. An exposed reef of slates dipping at an angle of 80° , was found to be intersected by veins cutting them at an angle of 56° N. E. Six such veins forming thin sheets of quartz, and having a gently undulating course, were observed in an exposure of five feet in perpendicular altitude, and in a horizontal distance of eight feet some of them would thin out from 2 inches in thickness, from their exposure, to two lines; others would pursue an undulating course and join with a vein above or below them. These oblique veins appear to be associated with the main veins which generally run in the direction of the strike of the slates. Persons are liable to be much deceived by these oblique veins, as they often expose a broad surface in the river, and seem to belong to the system first described; whereas none were found of a greater thickness than two or three inches. They may be associated with them, and consist of their ramifications, but sufficient details respecting their relationship has not yet been obtained to admit of the expression of a positive opinion respecting them.

3d. The Newest Veins.

Cutting through the main veins, which run with the strike, either at right angles to them or obliquely, are a multitude of small and continuous veins of quartz, which are of more recent origin than either of the two systems described. They cut straight through the older veins of two inches and more in diameter, but none were observed of a greater thickness than one inch, and by far the greater number were from half an inch to a line or less in diameter; they also appeared to form this

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sheet of unknown breadth, and were generally found to be free from foreign materials, and to consist of quartz alone. In a few instances, small crystals and specks of iron pyrites were discovered in them ; they were seen at a distance from the main or older veins as well as near to and intersecting them.

C. THE BOULDERS IN THE RIVER.

By far the largest number of the boulders in the bed of the Du Loup are of local origin, and consist of the upper silurian clay slates. There are, however, occasionally seen boulders partaking of the nature of a conglomerate, holding pebbles of slate, black in color and of very even fracture. A fine quartz-like conglomerate is also met with, as well as fragments of serpentine. Both of these conglomerates were observed in place in the rear of the Montreal House in the village of St. Francis, about twenty-four miles north of the spot where the boulders were seen in the bed of the du Loup ; the same rocks, which belong to the Quebec group, were also observed in the banks of the river opposite the Montreal House. A few boulders of syenite gneiss and epidosite were also recognized associated with those already described. These facts show that drift, not only from the Quebec group of rocks, which is known to be auriferous, has come from the north, and been distributed over the valley of the du Loup, but also boulders from the Laurentian series which lies to the north of the river St. Lawrence, distant some sixty miles in an air line. Fragments and rough masses of quartz are also very numerous in the bed of the stream ; these may be,

and probably are, in the majority of cases, of local origin, being derived from the quartz veins in the immediate neighborhood, or at least originating from the upper silurian clay slates; but, since boulders derived from the Quebec group (lower silurian), have been already stated to occur in the bed of the stream, and because quartz veins are known to intersect the rocks of the Quebec group in the parish of St. Francis, 24 miles north, it is more than probable that some of the quartz fragments may be derived from that source. The importance of this supposition will appear when the source or origin of the gold in the valley of the Riviere du Loup is discussed.

d. THE DRIFT CLAYS, GRAVELS AND SANDS.

The valleys of the Riviere du Loup and its tributaries are covered with drift clays, gravels and sands, which may be separated into two divisions, the glacial drift and the remodelled drift. The alluvial flats on the river banks are derived from these older deposits and the wearing away of the rocks in the beds of the streams.

The glacial drift is represented by the unstratified blue clay with its associated boulders of northern origin. This drift must not be confounded with the stratified blue clay which is occasionally found in the bed and on the alluvial banks of the Riviere du Loup, and has been produced by the re-arrangement of the materials of the older drift. The glacial drift is capped by beds of gravel, gravelly clay and stratified sand, and constitutes the remodelled drift. Fine and coarse sand beautifully stratified was found forming mounds on the east side of

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the Riviere du Loup one hundred and fifty feet above its present level, or upwards of 1,000 feet above the sea. The underlying blue clays and the newer overlying yellowish gravelly clays contain numerous fragments of quartz, both worn and unworn. While the greatest thickness of the drift observed in the immediate valley of the river was about sixty feet, it is probable that its depth does not on an average exceed fifteen or twenty feet on the plateaux and hillsides east and west of these well marked limits of the ancient river valley. The upper silurian slates appear to have contributed the largest portion of material to the drift of both deposits, the agents which produced them being probably ice in the one case, water in the other, thus giving rise to the difference in their composition and general character. The blue clay is excessively tenacious, and consists of very fine materials mixed with boulders, pebbles and fragments of foreign and local rocks, — much fine mica, iron pyrites and black sand in fine particles. The fine mud may have been produced by the grinding process of glacial ice, which agent was also instrumental in bringing the rock fragments of northern origin to their present position. The upper or remodelled drift was probably produced in part from the wearing away of the slates occupying the higher portions of the country, and the introduction of foreign material by the action of water, floating ice and subaerial denudation. Whatever may have been the nature of the forces which produced these different drift deposits, it is enough for present purposes to know that both contain not only materials of local origin but also a considerable propor-

tion of foreign detritus of northern origin, and susceptible of being identified with rocks in position lying from 24 to 60 or 70 miles north of the area where they are now found.

III. THE GOLD OF THE RIVER DU LOUP AND ITS TRIBUTARIES.

Before proceeding to discuss the origin of the gold which is found in the area to which this report refers, it will be convenient to describe a number of experimental trials which were made during the first and second week of June of the present year under the eye of the writer, for the express purpose of ascertaining the auriferous, or non-auriferous, character of the rocks in position, as well as of the overlying drift.

a. THE METGERMETTE.

No. 1, June 4th. Panned drift taken from ten feet above the river, found fine gold and scales, with a considerable quantity of black sand.

No. 2. Found gold in fine particles in the sand and gravel of the stream.

No. 3. Made several trials of the gravel between the slates which form reefs across the Metgermette, and, in every instance, found gold, estimated to the pan to be worth from one dollar downwards.

The larger fragments, or coarse gold, was generally found in the crevices between the slates and the gravel taken from them. [The specimens are in the possession of Mr. Ward, or other gentlemen belonging to the Com-

mittee, with the exception of one set which are in the possession of the writer, for the purpose of estimating roughly the auriferous value of the upper drift. This will be noticed subsequently.]

b RIVIERE DU LOUP.

June 6. No. 4. Pounded some quartz taken from a vein on the Rivière du Loup, and found in it seven small pieces of gold. Five of these were very slightly rounded at the edges, the other two were filiform masses; long, unworn and jagged.

No. 5. Crushed some quartz taken by the writer from the vein on the Du Loup opposite Ray's house. Washed the quartz before pounding to remove any adhering clay. The cracked mass of quartz yielded three unworn pointed or jagged scales.

The quartz in both instances was crushed with a hammer on a flat stone previously cleaned, and the quantity operated on was about 15 pounds in weight, rather under than over.

No. 6. Pulled up by the roots a pan full of grass growing on the banks of the river, and found in the washings two small pieces of pounded gold.

c. THE UPPER DRIFT.

Took three bushels of sand and gravel from the upper drift near the edge of the No. 1 Plateau on the Du Loup, about 120 feet above the level of the river. The earth was washed in ten pans, successively, and yielded as follows:

No. 7. Pan No. 1. One scale of yellow gold, not water worn ; also fine gold.

Pan No. 2. Fine particles of gold.

Pan No. 3. Three scales two-tenths of an inch in diameter, slightly water-worn, and one scale one-tenth of an inch in diameter, not water-worn.

Pan No. 4. Yielded no visible gold.

Pan No. 5. Two scales.

Pan No. 6. Yielded seven scales from two-tenths to one-tenth of an inch in diameter.

Pan No. 7. Fine gold.

Pan No. 8. Several scales and one water-worn fragment three-eighths of an inch in length, and a line and a half in diameter, — dark yellow gold.

Pan No. 9. One scale of bright yellow gold.

Pan No. 10. Two small water-worn nuggets, of dark-yellow gold, worth 25 cents each ; also, small scales of the bright yellow gold. (*N. B.* The bright yellow, unworn and jagged gold is supposed to come from the denuded quartz veins in position on the Du Loup, — the darker colored and worn gold from a northern source.

The gravel washed from the sand and clay contained numerous fragments of quartz, generally jagged and unworn, but some worn pebbles and small masses of quartz were seen. It also contained fragments, sharp-edged, of local slate and much black sand. The bright yellow or pale gold occurred in the form of unworn scales, and in one or two instances in the form of fine threads, also unworn, as seen through a good magnifying glass. The darker colored gold was always rounded

or water-worn. The hole from which the sand and gravel was taken, was about three feet deep, apparently unstratified, and was capped by ten inches of loam and decaying leaves. The whole plateau is densely wooded.

No. 8. Panned on a stream in the rear of lot 31, in the 8th range of Jersey, at an elevation of about 400 feet above the Du Loup, and about one mile and three quarters west of the river. Found the slates in place, intersected with heavy quartz veins running with the strike. Found flake gold, dark colored, well water worn.

No. 9. Panned one pan of gravel in the same stream at the extremity of lot 31, on the line of the 8th range of Jersey, estimated to be 250 feet above the Du Loup, or 1,150 above the sea. This pan yielded one rounded or water-worn scale $1\frac{1}{2}$ lines in diameter.

No. 10. A second pan from the clays in the same locality, taken close to the water's edge, gave no visible gold.

d. THE METGERMETTE—WITH THE CRADLE.

June 7. No. 11. Cradled on the Metgermette, just above the bridge on the Kennebec road. Took gravel and clay from the crevices between the slates. Two cradlings gave successively a considerable quantity of very fine gold, and numerous scales; this "prospect" was considered by two experienced Californian miners, and one Australian miner, who assisted in or witnessed the operations, but who had no interest in the results, to be "excellent pay." The cradle produced a large quantity of black sand, and with it there was mingled

much fine gold, which could not be separated by panning.

No. 12. Cradled about 150 yards above the bridge on the Kennebec road. The result gave one small water-worn fragment of gold, with a considerable quantity of fine gold and much black sand. The nugget was estimated to be worth 30 cents.

c. CRADLING ON THE RIVER DU LOUP.

No. 13. Excavated a new hole on the plateau opposite Ray's house, on the west side of the river, about 120 feet above it, and about five yards from the excavation made on the previous day. Found a hard gravelly pan eighteen inches below the surface; carried the clay and gravel down to the river. The cradle produced numerous scales of gold from half a line to a line in diameter, pale colored and bright. The quantity of earth cradled was about four bushels. A considerable quantity of gold in very fine particles remained in the black sand, which is in the possession of Mr. Ward.

No. 14. Excavated a hole half way down the escarpment or cliff about 60 feet above the river; panned and found in two pans unworn gold in ragged, bright yellow scales, and very fine gold in the black sand.

June 8th. No. 15. Visited the Portage river, on the east side of the Du Loup and beyond the limits of the area specially described in this report. At a house near the bridge, about 50 feet above the Portage, observed a quantity of clay thrown out in excavating a cellar; panned a portion of the clay and found "the color."

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No. 16. Panned on the Portage, also beyond the limits of the area under review. The first pan yielded two scales; one a line long, the other a third of a line. The gold was of the pale bright yellow variety, not much water-worn. The second pan gave "the color."

No. 17. Panned at the southeastern extremity of the area under review, from blue gravelly clay, seven feet above the Du Loup at its present stage; found a water-worn flat nugget of dark-colored gold, three lines long and one and a half in diameter.

No. 18. At the same locality, 50 feet above the river, panned a yellowish brown gravelly clay, lying above the bluish clay. At one and a half feet below the surface of the alluvial plateau found a small water-worn nugget of the dark colored variety, estimated to be worth 75 cents.

No. 19. A second pan from the same gravelly clay yielded a water-worn dark yellow and round particle a line in diameter.

No. 20. A third pan taken from just beneath the vegetable mould gave several small specks and fine gold of the bright yellow variety.*

The gravelly clay here (50 feet above the Du Loup) contains numerous fragments of quartz and many pebbles of slate, and unworn masses of local origin.

* The reader will understand that the terms "bright yellow variety," and "dark-colored gold" are used to distinguish one variety of gold from another; but the real difference in color is very trifling. It will be shown that the "pale unworn gold" is of local origin, and the "dark-colored gold" has travelled from the north,—an important distinction, as it reveals the existence of two gold fields overlapping one another.

June 9. Several members of the Committee panned clay and gravel from the Metgermette and the Riviere Du Loup with favorable results ; but, as the writer was not an eyewitness, it is unnecessary to make any further allusion to these experimental trials in this report.

No. 21. With the assistance of one of the members of the Committee (Mr. French), the writer pounded some quartz brought up from the vein in place opposite Ray's house on the Du Loup. The quartz was crushed on a slab of slate which had been previously cleaned. About a quart of the partially crushed quartz was panned, and yielded numerous particles and scales of gold, of the pale variety ; some of the particles were filiform and not perceptibly worn, when viewed through a powerful magnifying glass. The scales were in some instances three-quarters of a line in length and with jagged edges. There was also some fine gold present.

No. 22. A pan of "dirt" taken from between the three branches of the quartz vein exposed on the Du Loup opposite Ray's house, gave several particles of unworn gold with jagged edges, and some particles of apparently slightly worn gold.

No. 22 completes the series of trials made under the inspection of the writer. A nugget which had been taken from the bed of the Riviere du Loup opposite Ray's house, was shown to the writer ; also nuggets recently taken by working miners on the Gilbert river. The value of these nuggets was from ten to fifteen dollars each.

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IV. ESTIMATE OF THE VALUE OF THE DRIFT, BASED ON EXPERIMENT No. 7.

The weight of the gold obtained from three bushels of gravelly clay on the summit of the plateau, 120 feet above the river, opposite Ray's house, was $11\frac{1}{2}$ grains; this is equal to three and eighty-three hundredths of a grain to the bushel. Mr. W. P. Blake, in a report on the gold mines of Georgia* states that earth containing one twenty-fifth of a grain of gold to the bushel, can be profitably worked by the hydraulic method. Assuming that each bushel of earth yields on the plateau of the Du Loup three grains of gold, instead of $3\frac{83}{100}$, it will be seventy-five times richer than the earth which can be profitably worked by the hydraulic method; labor and provisions being considered equal in both cases. Hence it will appear that with every allowance for want of uniformity† in the distribution of the gold throughout the drift, which may be greater or less in quantity than the experimental trial showed, there is a wide margin to be allowed, before the value of the drift would sink to the scale of mere "profitable workings."

V. ORIGIN OF THE GOLD.

The experiments which have been described show that the quartz veins of the upper silurian clay slates on the Du Loup are auriferous. Indeed, a small mass

*See "Geology of Canada," Sir W. E. Logan, Director. pages 739 to 745.

† On the Touffe des Pins, sixty bushels of gravel from the bed of the stream, gave $7\frac{1}{2}$ grains of gold to the bushel. Geology of Canada, 1863.

of quartz, said to have been obtained from the quartz vein on the Du Loup opposite Ray's house, was seen by the writer, and, in a cavity, a particle of gold was distinctly visible with the naked eye, occupying its lower extremity, and into which it could not have been placed by artificial means. The gentleman who procured the fragment of quartz, a few days before the arrival of the writer on the spot, is worthy of the utmost confidence. Nevertheless, although a careful inspection was made of a large number of fragments broken from the veins of quartz on the area in question no gold was seen in the quartz; but the results of the crushing process described are sufficient to convince the writer, without any other testimony, that the quartz veins in the upper silurian slates exposed on the Rivière du Loup are auriferous. It must also be borne in mind that it is extremely difficult to detect gold in auriferous quartz of known value; and, although the quartz veins in Nova Scotia are worked at a large profit, it is a rare occurrence for gold to be seen in place.

There is, moreover, the evidence of Sir W. Logan, the director of the Geological Survey of Canada, that gold exists in the quartz veins of the upper silurian slates. "Native gold," he says, "has, however, been found in small grains with galena, blende, and pyrites, in a well-defined quartz vein, cutting slates which are supposed to be of upper silurian age, at the rapids of St. Francis on the Chaudière.*" (Page 518-520 *Geology of Canada*, 1863.)

* "In 1862, another quartz vein was opened about 100 yards from the last, and has yielded fine specimens of native gold, associated with arsenical pyrites." See also Report for 1863, pages 70 to 73.

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The scales of gold of the bright pale yellow variety found everywhere in the drift on the Du Loup and the Metgermette, both near and remote from those rivers, are considered by the writer to originate from the decomposed and decomposing ruins of the quartz veins, which penetrate the upper silurian slates, and are consequently of local origin. It is not intended to assert that all the gold belonging to the pale variety is derived from local rocks above, below, or even some distance from the place where the gold is found. It is probable that some portion may be derived from the travelled quartz fragments, some of which have come with the northern drift from the Quebec group of rocks, which lie to the north of the upper silurian slates below the St. Francis Rapids on the Chaudiere. It is thought, also, that the dark colored gold, which is always rounded by attrition, has in great part come from the north, and that the quartz veins of the Quebec group were its original seat. This view suggests an important conclusion, namely, that the auriferous drift clays and gravels of the Riviere Du Loup really enclose the products of two distinct series of gold-bearing rocks, the upper silurian slates and the lower silurian schists, represented on the Chaudiere, north of a few miles above the Guillaume river, in the parish of St. Francis, by the Quebec group. It has been stated in the section describing the drift clays and gravels of this area, that boulders of northern origin are not uncommon, and the same agent which brought these boulders, namely, glacial ice, would also convey the material of broken down quartz veins, belonging to the rocks north of the upper silurian slates.

VI. THE BLACK SAND.

Every washing showed the existence of a considerable quantity of black sand in the gravels, clays, and alluvial deposits. A magnet passed through the black sand, shows the presence of a considerable quantity of magnetic oxide of iron. Dr. Hunt, of the Geological Survey of Canada has at different times examined this black sand and found it to consist of magnetic iron; hematite, both specular and compact, chromic iron and ilmenite, with occasional grains of garnet rutile, and more rarely zircon and corundum. Portions of native platinum and iridosmine have also been obtained. It is very difficult by the ordinary process of washing to separate the fine gold from the black sand, and in extensive works for the extraction of the gold from the drift, the black sand should always be saved.

VII. CONCLUSION.

The opinion which the writer is now enabled to express respecting the commercial value of the area described in this report as a gold-yielding tract of country, is very favorable. So many conditions appear to unite in conferring on it advantages rarely met with in auriferous districts, that no doubt can be entertained respecting the commercial success of properly conducted works for the separation of the gold. It may be advisable to specify these advantages with some detail. They are,

1. The uniform distribution of the gold in the drift clays and gravels in the valleys and on the uplands.

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2. The occurrence of rapid streams with abundance of water for sluicing, fluming, or power throughout the entire area under review.

3. The existence of numerous quartz veins which have been shown to be auriferous, and which can be worked during the entire year.

4. The comparative shallowness of the drift on the uplands which will admit of the clay slates being easily reached, where the coarse or heavy gold will most probably be found in the fissures of the slates exposed.

5. The facility with which the Metgermette, the small streams flowing into the Riviere du Loup and the Du Loup itself can be diverted from their channels, and the present beds of these rivers exposed and worked. The beds of these rivers may be regarded as sluices on a gigantic scale which have been engaged in the operation of separating the gold from the drift for ages, and which have treasured up the products of their labor in the beds where they now flow, the gold being caught by the numerous reefs of slates which stretch across the river, and is thus protected from the wearing action of attrition.

HENRY Y. HIND.

Quebec, June 13, 1864.

EXTRACT

*From a speech of His Excellency, the Governor General of Canada,
June 30, 1864, delivered at the Prorogation of Parliament.*

The discoveries of mines of the precious metals, within our territory, have rendered necessary new regulations in reference to the management of that part of the public property, and I confidently expect that the enactments of the Gold Mining Bill of this session will be found effectual for the protection of the Revenue, and will stimulate the development of this important branch of the Provincial resources.

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